

WHAT IS CLAIMED IS:

1. A bearing apparatus, comprising:

a cylindrical bearing sleeve including an inner wall having a first circumferential groove extending therearound;

a bearing shaft rotatably located within said bearing sleeve and having a second circumferential groove extending therearound, said second groove aligned with said first groove; and

a coil spring in the form of a continuous loop located within said first and second grooves and arranged to rotatably and removably retain said bearing shaft in said bearing sleeve.

2. The bearing apparatus of claim 1, wherein said coil spring is held under longitudinal tension in said second groove.

3. The bearing apparatus of claim 1, wherein coils of said coil spring are radially compressed between said first and second grooves.

4. The bearing apparatus of claim 1, wherein coils of said coil spring are canted at an angle of about 30 degrees to the longitudinal axis of said coil spring.

5. The bearing apparatus of claim 1, wherein said first and second grooves are generally V-shaped and each thereof includes first and second sloping surfaces, and wherein said first and second grooves and said coil spring are configured such that coils of said coil spring make point contact with said first and second sloping surfaces of said first and second grooves.

6. The bearing apparatus of claim 1, wherein at least one of said first and second grooves has a truncated V-shape.

7. Apparatus for rotating a window in an enclosure, comprising:

a cylindrical bearing sleeve located in a wall of the enclosure, said bearing sleeve including an inner wall having a first circumferential groove extending therearound;

5 a bearing shaft rotatably located within said bearing sleeve and having a second circumferential groove extending therearound, said second groove aligned with said first groove;

10 a coil spring in the form of a continuous loop located within said first and second grooves and arranged to rotatably and removably retain said bearing shaft in said bearing sleeve; and

said bearing shaft being in the form of an open cylinder and arranged to hold the window therewithin.

15 8. The apparatus of claim 7, wherein said first and second grooves are generally V-shaped and each thereof includes first and second sloping surfaces, and wherein said first and second grooves and coil spring are configured such that coils of said coil spring make point contact with said first and second sloping surfaces of said first and second grooves.

20 9. The apparatus of claim 7, further including an arrangement for rotating said bearing shaft within said bearing sleeve.

25 10. The apparatus of claim 9, wherein said rotating arrangement includes an annular flange on one end of said bearing shaft, said flange having gear teeth around the periphery thereof, and a drive shaft having a worm gear thereon engaging said teeth of said flange such that said bearing shaft can be rotated by rotating said drive shaft.

11. The bearing apparatus of claim 7, wherein said coil spring is held under tension in said second groove.

30 12. The bearing apparatus of claim 7, wherein coils of said coil spring are radially compressed between said first and second grooves.

13. Apparatus for rotating a window in a laser enclosure, the laser enclosure including a laser resonator arranged to deliver an output beam from the enclosure via the window, the apparatus comprising:

5 a bearing member on the enclosure the bearing member having a circular aperture extending therethrough into the enclosure, and said circular aperture having a circumferential wall, said circumferential wall having a first groove extending completely therearound;

10 a window holding member, said holding member having a cylindrical body portion arranged to rotatably fit in said circular aperture in said bearing member, and said cylindrical body portion including arrangement for holding the window therein;

15 said bearing member and said window holding member being configured such that when said cylindrical body portion of said window holding member is fitted in said circular aperture in said bearing member a longitudinal rotation axis of the window is defined and said window may be rotated about said rotation axis by rotating said cylindrical body portion of said window holding member;

20 said bearing member and said window holding member been further configured such that when said cylindrical body portion of said window holding member is fitted in said circular aperture the output beam is transmitted through the window at a first region thereon offset from said rotation axis by a predetermined distance, said predetermined distance selected such that said window holding member may be rotated such that the output beam is transmitted therethrough at a second region thereon angularly displaced from said first region; and

25 said cylindrical body portion of said window holding member having a second groove extending completely therearound, a coil spring in the form of a continuous loop being located, under tension, in said second groove, said coil spring been configured such that when said cylindrical body portion of said holding member is fitted in said circular aperture said coil spring also extends around said first groove in contact therewith, said first and second grooves and said coil spring being configured
30 such that said window holding member is removably and rotatably retained in said bearing member.

14. The apparatus of claim 13, further including an arrangement for rotating said window holding member.

15. The apparatus of claim 14, wherein said rotating arrangement includes an annular flange on one end of said cylindrical body portion of said cylindrical holding member, said flange having gear teeth around the periphery thereof, and a drive shaft having a worm gear thereon engaging said teeth of said flange such that said window holding member can be rotated by rotating said drive shaft.

16. The apparatus of claim 13, wherein said first and second grooves are generally V-shaped and each thereof includes first and second sloping surfaces, and wherein the first and second grooves and coil spring are configured such that coils of said coil spring make point contact with said first and second sloping surfaces of said first and second grooves.

17. Laser apparatus, comprising:

a laser located in an enclosure;

a cylindrical bearing sleeve located in a wall of said enclosure, said bearing sleeve including an inner wall having a first circumferential groove extending therearound, said first groove being generally V-shaped and including first and second sloping surfaces;

a bearing shaft rotatably located within said bearing sleeve and having a second circumferential groove extending therearound, said second groove being generally V-shaped and including first and second sloping surfaces, and said second groove being aligned with said first groove;

said bearing shaft being in the form of an open cylinder having a window held therewithin, said window having a rotation axis corresponding to the rotation axis of said bearing shaft;

a coil spring in the form of a continuous loop located within said first and second grooves with coils of said coil spring in point contact with said first and

second sloping surfaces of said first and second grooves, thereby rotatably and removably retaining said bearing shaft in said bearing sleeve; and

said laser providing a laser beam and arranged in said enclosure such that said laser beam is transmitted through said window at a point at a first region thereon
5 offset from said rotation axis thereof by a predetermined distance, said predetermined distance selected such that said bearing shaft may be selectively rotated to cause said laser beam to be transmitted through said window at a second region thereon displaced from said first region.

2025 FEB 01 10:54 AM